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The Examiner is requested to reconsider his rejection under 35 U.S.C. §102(b) of Claim 1 as being anticipated by Lee, et al. (US 6,008,989).

Claim 1 has been amended further to distinguish the present invention from the Lee et al. reference. Applicant's structure as claimed is now totally distinguishable over what the reference to Lee et al. is disclosing. Applicant is claiming a heat sink. The claimed heat sink is used in combination with a semiconductor chip device and a planar support. The structure of the heat sink *alone* is that which is defined in Applicant's claims.

The description of the invention by Lee, et al. clearly shows the difference between Lee, et al. and the present invention. In the reference to FIG. 1, Lee, et al. discloses a securing device 30 for attaching a heat sink 10 to a CPU module 70. There are three separate elements to the Lee, et al. invention: the securing device which comprises the various elements denoted 30 in Figure 1 and the heat sink element 10 fixed to CPU module 70.

By way of contrast, in Applicants invention, the fingers 14 contact the chip first. The idea is that the fingers are the extension of the fin body 6, which are the main heat transfer surface to the air passing through the fin body. In this arrangement, heat coming from the chip is directly conducted to the fin body. In the prior art, heat usually goes to the base of heat sink and then the fins, such that heat needs to go through the interface between the heat sink base and the fins and hence encounters higher thermal resistance. Consequently, the efficiency of the heat sink is lowered. Applicant's invention as claimed eliminates this drawback.

In the "compliant interface" 13, the contact interface between the finger outer surface and the chip is flexible and adaptable in a way that the interface can accommodate the issues of planarity, flatness, movement, and thermal expansion of the underlying chip. For example, if the heat sink is not parallel with the chip surface and the heat sink base is rigid, the gap between the heat sink base and the chip may vary. That is, part of the contact interface has larger gap and part has no gap. The local heat transfer from the chip to the heat sink will be impeded at the

location that has larger gap. This is a big disadvantage of prior art heat sinks with a rigid base. The current invention solves this problem. This feature is not a focus of the Lee invention.

The Examiner asserts in the Office Action that he "must interpret the limitations as broadly as it reasonably allows." (Emphasis supplied)

Lee claims a heat sink assembly which is a combination of at least three separate elements. These are the electronic heat device package, the heat sink and the bracket or securing device.

Lee claims the assembly as comprising:

an electronic device package having a plate on a surface thereof;
a heat sink having a base in contact with the plate of the device package, a plurality of cooling elements extending from the base and arranged in two columns, a groove defined between the two columns of cooling elements, and a first hole defined in the base at a bottom of the groove; and
a securing device for attaching the heat sink to the device package, said securing device comprising:
an engaging bracket including a main body and an extension portion extending from each distal end of the main body; and
an elongate abutting member having a first end received in the first hole of the heat sink to abut against the plate of the device package, and a second end engaging the engaging bracket;
wherein the main body of the engaging bracket is received in the groove of the heat sink and the extension portions of the engaging bracket engage with the device package for firmly and elastically attaching the heat sink to the device package by the abutting member.

Clearly the specification and the claims of Lee, et al. are not directed solely to a heat sink. At Column 7, lines 7 – 15, the Lee et al. description clearly discloses and confirms that their invention is directed toward a securing device for easily removably attaching a heat sink to a vertically mounted CPU module. A major feature of the Lee et al. invention is that the securing device, which is nothing more than a bracket that has resilient claws to securely engage the heat sink with openings defined in the CPU. This provides the heat sink assembly with the capability to withstand affects of shock and vibration. In addition, the simplified design and improved function of the securing device allow heat sinks of different dimension to be secured thereby decreasing manufacturing costs.

The Lee, et al. invention embodied in their disclosure as applied by the Examiner in his rejection of Claim 1, is limited to a pair of "intermediate brackets" which serve to secure one element

(heat sink) to another (CPU module). The Lee, et al. invention is not a heat sink by itself, nor is it designed to function as a heat dissipation device *per se* used with a printed wiring board.

Claim 1 now covers: "A heat sink comprising means for improving the transfer of heat from at least one heat source mounted on a planar support to said heat sink radiating into the ambient, wherein said heat source is a semiconductor chip device on a common wiring bearing planar support..."

Lee et al. do not disclose a heat sink *per se*. They disclose a combination of elements, but no one of the individual elements of the combination by itself reads on or is anticipated by Applicant's invention as presently claimed. The heart of the Lee, et al. invention is the bracket. The Examiner asserts that the bracket, referred to by him in the instant Office Action as "clip (50)" reads on the fin member since all of the elements of the fin member are found in Applicant's claimed invention. It is respectfully submitted that the "clips (50)" are exactly what they are, that is "clips." They secure one element of the assembly to another. That is their function—to secure—not to dissipate heat from the chip.

The invention of Lee, et al. is depicted clearly in Figures 7 and 8. The specification at Column 3, line 67 through Column 4, line 4, describes the invention as follows:

"...FIG. 7 shows an engaging bracket 50' with another type of disassembly hole 56' formed in the extension portion 52' by a stamping procedure whereby a tab 57' projects outward from each extension portion. FIG. 8 shows an engaging bracket 50" with yet another type of disassembly hole 56" defined in the extension portion 52" by a punching procedure whereby a projection (not labeled) is formed surrounding the disassembly hole 56"..."

Applicant's heat sink is:

"a modular assembly having a plurality of support fin members contiguously aligned side by side..."

The brackets or clips of Lee et al. (which the Examiner contends are the "fins") are not aligned contiguously (i.e. touching or in contact) side by side. This contact among the support fins promotes greater cooling efficiency to carry the heat from the semiconductor to the ambient.

Applicant further defines his support fin members saying:

"said support fin members being formed from heat conducting material sheets selected from the group consisting of copper, aluminum or graphite fiber composite, said support fin members being in horizontal and vertical alignment with one another and extending longitudinally and in alignment with said planar support and covering said combination comprising said area;..."

The clips of Lee, et al. are not formed from the metals claimed. The metals claimed by Applicant serve to efficiently carry off the heat from the semiconductor. The brackets of Lee, et al. only need to have strength to support and attach the heat sink to the PCB. Further, Applicant claims in amended Claim 1:

"each said support fin member having been formed from said single heat conducting material sheet and folded into a substantially inverse U shape, each said support fin member having a top surface that extends continuously along the longitudinal axis of said support fin member, having first and second side arms diametrically opposite each other, each said support fin member first and second side arm having an inside surface, an outside surface and an edge, each said edge having a finger portion, each said finger portion consisting of a straight planar surface;..."

Reference is made to Figures 7 and 8 in Lee, et al. referred to above which show that the brackets 50' and 50" contain three openings along the vertical axis as depicted in the drawings. Applicant's fins do not have the openings as these openings would render the heat sink less efficient. The metal of the fin is needed to draw the heat away from the source and dissipate it to the ambient. An open space in the top of the fin does not promote or accelerate heat dissipation.

Applicant further claims in amended Claim 1:

"a plurality of parallel beam members made from heat conducting material, each said beam member having top, bottom and first and second side walls, said first and second side walls of each beam member being positioned between and in contact with said inside surface of said first and second side arms respectively of each said support fin member;..."

The Examiner asserts in the Office Action that element 18 in Figure 2 of Lee et al. meets this excerpt of amended Claim 1.

Lee, et al. state at Column 3, lines 1 – 7:

"Also referring to FIG. 2, the heat sink 10 has a plurality of cooling fins 14 extending from a base 12 thereof and aligned in three columns. A groove 22 is defined between adjacent columns of cooling fins 14, a first hole 16 is defined through the base 12 of the heat sink 14 at the bottom of each groove 22, and a pair of cutouts 18 are defined at opposite ends of each groove 22."

The "beam members" claimed by Applicant are depicted at 12 in Figure 1 and are strips of metal which are thicker than the sheet material comprising the fins. The beams are made of a heat conducting material such as copper or aluminum. As noted in the excerpt from the Lee et al. disclosure set forth above, element 18 is not an element associated with the "brackets" (50' and 50" of Figures 7 and 8 respectively). Element 18 is mentioned in connection with the heat sink

portion of the Lee, et al. Heat Sink Assembly. The "assembly" embodies the heat sink module and a bracket for mounting same. The heat sink module and the bracket are distinct entities. The bracket serves no heat dissipation benefit and thus is not a heat sink. Further, element 18 in Figure 2 of Lee, et al. is not a defined element but rather is a "pair of cutouts." It (18) is a space and thus is not a definite element that can be applied in a positive recitation of an element in an "anticipation" rejection.

It is respectfully submitted that the Examiner's application of the Lee, et al. reference is selectively choosing elements from disparate articles to make the anticipation rejection. Applicant is claiming a "heat sink" as a distinct unit with all elements of same contained within the distinct unit. The Examiner has selected a reference to Lee, et al. which is directed "*particularly to a securing device for a heat sink assembly which facilitates the removable attachment of a heat sink module to an electronic device package.*" (Column 1, lines 6 – 9)

It is improper for the Examiner to select the bracket as the basis for the anticipation rejection and then select an element from the heat sink module to supplement an element that is missing in the bracket in order to anticipate each and every element as required in an anticipation rejection. Even if all of the elements claimed by Applicant were found in the sum total of the elements comprising the heat sink assembly of Lee, et al., the Examiner's rejection is without proper foundation because not all of the elements disclosed by Lee, et al. are found in a single device.

Applicant has recited above in Claim 1 that the "fingers" are straight as depicted in Figure 1.

Applicant further defines the fingers:

"said straight finger portion of said edge extending below said bottom wall of said beam member and being folded inwardly toward a center line of each said beam member into said straight finger portion of said edge extending below said bottom wall of said beam member and being folded inwardly beneath said beam toward a center line of each said beam member into a bent position to form a contacting support structure for said heat sink, said straight finger portions folded inwardly beneath said beam forming a compliant interface in contact with said heat source to dissipate heat emanating from said heat source to said heat sink."

The discussion of Claim 1 as set forth above distinguishes the instant invention from the Lee, et al reference. The basis for the language in the claim is found in both the specification and Figure 1 of the drawings.

The Examiner is respectfully requested to reconsider the rejections of Claims 2 and 3 under 35 U.S.C. 103(a) as being unpatentable over Lee, et al. (US 6,008,989) in view of Bradt (US 5,909,358).

All of the remarks presented above with respect to the Lee et al. reference are incorporated by reference herein. Applicant is not clear as to the relevance of the Bradt reference to the instant invention. Bradt discloses a "clip" which is made of a metal. Applicant is claiming a side which comprises a part of the heat sink assembly.

The Examiner is respectfully requested to reconsider the rejections of Claims 4 and 6 under 35 U.S.C. 103(a) as being unpatentable over Lee, et al. (US 6,008,989) in view of Bradt (US 5,909,358) and further in view of Lin et al. (US 6,188,578).

The skilled artisan would not look to either of the secondary references as there is no suggestion to do so. Lin et al. relates to "flip chip" technology which is different from the bracket technology of Lee et al. and the heat sink clip of Bradt. The requirements in all three disciplines are antithetical to one another.

For example, Figs. 3(a), (b), (c) are variations of the finger arrangement. All the fingers will directly contact the chip first. Furthermore, the folding fingers in Fig. 1 provides an additional spring force to make a much compliant contact with the chip or other heat generating surface. In other words, the folding structure in forming the fingers gives a natural spring force to force the bottom surface of the fingers in contact with the chip.

In Fig. 3a, the member 42 is thermal grease which resides between the beam 12 and the inner surface of the finger 14. This thermal grease will further reduce the thermal resistance between the finger bottom surface to the chip when the grease flows and fills the gap therein. It also reduces the thermal resistance between the fin body and the beam 12, which is the secondary heat path in addition to the primary heat path from the finger to the fin body.

Fig. 3b uses elastomeric resilience 32 to improve the natural spring force created by the folding structure of the fingers. When the heat sink is forced in contact with the chip, the fingers will be bent further close to the bottom surface of beam 12. In this case, the elastomeric resilience provides another reaction force to push the fingers toward the chip. The end result is larger local force to make the fingers in better contact with the chip and hence a better thermal contact to transfer heat from the chip to the fin body.

Fig. 3c uses low melting point solder 22 instead of thermal grease 42. The function of low melting point solder is the same as that of thermal grease as in Fig. 3a. It may work better thermally since low melting point solder generally has high thermal conductivity, which should give even better thermal contact than that of thermal grease. This assumes that the solder will melt (that is, change from solid to liquid phase) when the temperature at the finger and chip interface is higher than the melting point of the solder.

The prior art cited, alone or in combination does not function as explained above nor does it provide the benefits of Applicant's invention.

In order to analyze the propriety of the Examiner's rejections in this case, a review of the pertinent applicable law relating to 35 U.S.C. § 103 is warranted. The Examiner has applied the Lee et al., Bradt and Lin et al. references discussed above using selective combinations to render obvious the invention.

The Court of Appeals for the Federal Circuit has set guidelines governing such application of references. These guidelines are, as stated are found in Interconnect Planning Corp. v. Feil, 774 F.2d 1132, 1143, 227 USPQ, 543, 551:

When prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than hindsight gleaned from the invention itself.

A representative case relying upon this rule of law is Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 5 USPQ 2d 1434 (Fed. Cir. 1988). The district court in Uniroyal found that a combination of various features from a plurality of prior art references suggested the

claimed invention of the patent in suit. The Federal Circuit in its decision found that the district court did not show, however, that there was any teaching or suggestion in any of the references, or in the prior art as a whole, that would lead one with ordinary skill in the art to make the combination. The Federal Circuit opined:

Something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. [837 F.2d at 1051, 5 USPQ 2d at 1438, citing Lindemann, 730 F.2d 1452, 221 USPQ 481, 488 (Fed. Cir. 1984).]

The Examiner has cited *In re Fine* (citation omitted) in the Office Action. That case supports Applicant's assertions in this response to the Examiner's Section 103 rejection where it states:

"...Obviousness is tested by "what the combined teachings of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." *ACS Hosp. Sys.*, 732 F.2d at 1577, 221 USPQ at 933. And "teachings of references can be combined only if there is some suggestion or incentive to do so." *Id.* Here, the prior art contains none.

Instead, the Examiner relies on hindsight in reaching his obviousness determination. But this court has said, "To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *W.L. Gore*, 721 F.2d at 1553, 220 USPQ at 312-13. It is essential that "the decisionmaker forget what he or she has been taught at trial about the claimed invention and cast the mind back to the time the invention was made ... to occupy the mind of one skilled in the art who is presented only with the references, and who is normally guided by the then-accepted wisdom in the art." *Id.* One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention..."

The Examiner further cites *In re Jones* (citation omitted) which also supports Applicant's position with respect to the obviousness rejections made by the Examiner. The *Jones* case is one directed toward patentability of a chemical compound so it relates to a slightly different discipline when it comes to obviousness. The *Jones* opinion states *inter alia*:

"...Before the PTO may combine the disclosures of two or more prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598-99 (Fed.Cir.1988). We see no such suggestion in *Zorayan*, which is directed to shampoo additives, nor in *Wideman*, which teaches that the amine used to make the claimed compound is a byproduct of the production of morpholine. Nor does the broad disclosure of *Richter* fill the gap, for the reasons discussed above..."

Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill in the herbicidal art would have been motivated to make the modifications of the prior art salts necessary to arrive at the claimed 2-(2'-aminoethoxy) ethanol salt. See Grabiak, 769 F.2d at 731-32, 226 USPQ at 872 ("[I]n the case before us there must be adequate support in the prior art for the [prior art] ester/[claimed] thioester change in structure, in order to complete the PTO's *prima facie* case and shift the burden of going forward to the applicant."); In re Lalu, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed.Cir.1984) ("The prior art must provide one of ordinary skill in the art the motivation to make the proposed molecular modifications needed to arrive at the claimed compound.")

Applicants respectfully submit that there is no basis for the combination of the aforementioned references cited by the Examiner. Applicants respectfully point that the Lee et al., Bradt and Lin et al. references have totally different objectives in mind. The Examiner has selected individual elements from these disparate references for the sake of showing the individual elements claimed without regard to the total teaching of the references.

The Examiner is improperly picking and choosing. The rejections are piecemeal constructions of the invention. It is essentially including the elements missing from Lee et al. with the elements conveniently found in Bradt and Lin et al. references which alone or in combination are directed to a totally different fields of disciplines. Such piecemeal reconstruction of the prior art patents in light of the instant disclosure is contrary to the requirements of 35 U.S.C. § 103.

The ever present question in cases within the ambit of 35 U.S.C. § 103 is whether the subject matter as a whole would have been obvious to one of ordinary skill in the art following the teachings of the prior art at the time the invention was made. It is impermissible within the framework of Section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. (Emphasis in original) In re Wesslau 147 U.S.P.Q. 391, 393 (CCPA 1965)

This holding succinctly summarizes the Examiner's application of references in this case because he did in fact pick and choose so much of the references to Bradt and Lin et al. references to support his position and did not cover completely in the Office Action the full scope of what these varied disclosure references fairly suggest to one skilled in the art.

Further, the Federal Circuit has stated, as noted above in the *In re Fine* opinion, that the Patent Office bears the burden of establishing obviousness, and that this burden can only be satisfied by

showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the reference.

Obviousness is tested by "what the combined teachings of the references would have suggested to those of ordinary skill in the art." In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." ACS Hosp. Sys., 732 F.2d at 1577, 221 USPQ at 933. [837 F.2d at 1075, 5 USPQ 2d at 1599.]

The court concluded its discussion of this issue by stating that teachings or references can be combined only if there is some suggestion or incentive to do so. In the present case, the skilled artisan viewing the any or all of the references would be directed toward a totally different system than is called for in the present invention.

In view of the arguments and modifications to the claims, allowance of this case is warranted. Such favorable action is respectfully solicited.

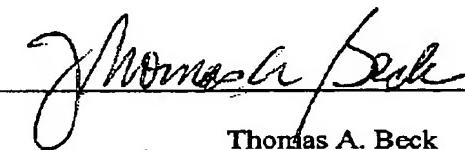
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I hereby certify that this amendment response is being telefaxed to (571) 273-8300 on the date indicated below addressed to Commissioner of Patents & Trademarks, Post Office Box 1450, Alexandria, VA 22313-1450.



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